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GROWTH RESPONSE OF PLANTED PITCH PINE
TO DIFFERENTIAL PRUNING

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Appreciation of the character of growth response to be expected following different pruning intensities is important in establishing pruning practices in planted stands of young pitch pine (Pinus rigida Mill). While the benefits derived through improved wood quality consequent to pruning have in a general way been recognized, optimum pruning practices on the basis of either highest wood quality or maximum tree growth have not been defined to a satisfactory degree.

This paper is a preliminary report on the results of an experiment initiated in 1939, designed to obtain specific information on growth of planted pitch pine following different degrees of pruning. The study has been set up on a long-time basis and subsequent prunings will be made at expedient intervals, as dictated to a large degree by the growth and development of the trees. The area under examination was planted with 1-1 stock in 1935, and is located at the Southern Illinois Branch of the Central States Forest Experiment Station, Hardin County, Illinois.

The plantation was divided into three strips, each about one-third acre, and each containing an average of 470 trees on a six-by-six spacing. On each of the strips about 200 crop trees were selected on the basis of form, spacing and thrift. At the time of pruning these trees averaged 6.17 feet in height, with diameters at 1.5 and 4.5 feet of 1.91 and 1.36 inches, respectively. Four degrees of pruning were assigned at random, each to one-quarter of the crop trees on each strip: (1) No pruning, i.e., left as check; (2) light pruning, only lower branches up to about 1.5 feet removed, and on many of these the needles had already died or were turning brown; (3) moderate pruning to an average height of 2.75 feet or slightly less than half the crown removed; (4) heavy pruning, two-thirds to three-quarters of the crown to an average of 3.8 feet removed.

Immediately following the pruning, measurements of total height were taken on all trees. Diameters at 1.5 and 4.5 feet were measured to 0.1 inch with a tree fork especially adapted to this use. At the termination of the growing season these measurements were repeated, and will be retaken each fall. Additional diameter measurements at three-foot intervals on the stem will be made as the trees attain sufficient size and further prunings are made. In table 1 is presented a summary of mean height and diameter increments at two points on the stem for four degrees of pruning.

Table 1. Mean diameter and height increments of pitch pine during first growing season following pruning

Intensity of Pruning :	Diameter Increment : at 1.5 ft.	Diameter Increment : at 4.5 ft.	Height Increment
	Inches	Inches	Feet
None (Check)	0.363	0.496	2.18
Light	0.343	0.452	2.23
Moderate	0.300	0.444	2.05
Heavy	0.222	0.412	2.05

The three strips were replicates and pruning effects in terms of increment were evaluated according to an analysis of variance. Even though these results represent only the first-season response, there were strong indications of differences arising, presumably as a consequence of pruning. In every case there was a gradation of growth from unpruned to heavily pruned trees. This difference in the case of total height was but 0.13 feet and was not significant. Differences in diameter growth, however, were much more clearly defined.

Diameter increment at 1.5 feet on heavily pruned trees was significantly less than the corresponding increment on lightly pruned and unpruned trees. The differences were 0.121 and 0.141 inches, respectively, or 35 and 39 percent of the mean increment of unpruned trees. Other increment differences between treatments were nonsignificant, the greatest being a "loss" of 0.078 inches between moderate and heavy pruning. Diameter growth differences at 4.5 feet attained the 20 percent level of probability but were not significant.

The retarding effect of heavy pruning upon diameter increment is much less pronounced at 4.5 feet than that at 1.5 feet. This is illustrated in the table by the fact that the diameter increment "decrease" from no pruning to heavy pruning at 4.5 feet is 0.084 inches or 16.9 percent of check, as compared to a "decrease" at 1.5 feet of 0.141 inches or 35.8 percent. There is manifest in these relationships a trend in heavily pruned trees toward a more cylindrical stem. It is of course too early to draw conclusions as to the future development of tree form as modified by pruning, but should the present trend continue as the trees mature, a possibly superior, more cylindrical bole will result. It is recognized that this improvement in form, should it occur, would at first probably be at the expense of diameter increment. However, it is also possible that after prunings have been completed, presumably at a relatively early age, this increment will be regained in subsequent years' growth.

In summary, it appears from the preliminary results of this investigation that during the first year following pruning of pitch pine: (1) Height growth was not affected by any degree of pruning tested; (2) diameter growth was not materially affected by light or moderate pruning; (3) heavy pruning resulted in a relatively heavy loss in diameter increment; and (4) this loss in increment is less at the upper (4.5-foot) than at the lower (1.5-foot) diameter, thus tending to develop a more cylindrical stem.